

STUDIES IN THE HELIANTHEAE (ASTERACEAE). VIII.

NOTES ON GENUS AND SPECIES LIMITS

IN THE GENUS VIGUIERA.

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The genus Viguiera contains the greatest diversity of species of any genus in the subtribe Helianthinae, and both the generic and species limits have been subject to question. The genus has been studied on a classical basis by Blake (1918) and comparatively few additions have been made since that time. Of particular interest are the more herbaceous species of the genus which form the typical element and which could be included in a more narrowly circumscribed genus concept. Some immediate relatives have been placed in segregate genera and the policy is followed here that was initiated by D'Arcy (1975) in the Flora of Panama, the herbaceous species with 1-3 seriate involucre and shortly but distinctly appendaged styles of the disk flowers are placed in Viguiera regardless of the presence or absence of differentiated awns and squamellae on the achenes. In addition to the new species described below, a number of details of floral structure have been noted for other species. The group seems to have many characters in its "floral anatomy" that are useful at the species level, though such characters are comparatively rare in other Heliantheae.

Viguiera dentata (Cav.) Spreng. includes the type species of the genus, V. helianthoides HBK., and is distributed widely in the West Indies, Mexico and Central America. The involucre bracts tend to be distinctive by the base being nearly filled by a pair of prominent costae and by the distinct linear tip. The species proves far more distinctive and unique in the genus by the presence of hairs on the filaments of the anthers which usually form a dense pubescence visible in the opened corollas under the dissecting microscope. The disk corollas also have the basal tubes nearly glabrous, the throat densely scabrous below, and the throat less than twice as long as the lobes, a combination of features differing from most members of the genus.

Viguiera molinae H. Robinson, sp. nov.

Plantae herbaceae 1½-2 m altae laxae ramosae. caules brunnescentes vel rubro-tincti teretes et minute striati sparse antrorse strigosi. Folia alternata, basilaris opposita?, petiolis angustis plerumque 5-10 mm longis dense strigosis; laminae ovatae vel lanceolatae plerumque 4-8 cm longae et 1-4 cm latae base breviter acutae vel vix acuminatae margine 6-17 argute serratae sensim in foliis superioribus minoribus sub-integra et integra apice longe anguste acuminatae supra sparse appresse strigosae et dense minute scabridae subtus densius strigosae fere ad basem valde trinervatae. Inflorescentiae laxae subcymosae, pedicellis tenuibus 1.5-3.0 cm longis dense strigosis. Capitula ca. 8 mm alta et 5-6 mm lata. Squamae involucri ca. 8-10 plerumque uniseriatae erectae herbaceae lanceolatae 4-5 mm longae et 1.0-1.2 mm latae apice anguste acutae extus dense strigosae. Paleae chartaceae oblongae ca. 5 mm longae et 2 mm latae superne irregulariter breviter serratae apice breviter acutae vix erectae apiculatae extus variabiliter puberulae in nervis mediis strigosae viridivittatae. Flores radii 0-1 in capitulo steriles; corollae flavae, tubis tenuibus ca. 1.2 mm longis superne parce puberulis, limbis late ellipticis ca. 2.5 mm longis et 1.8 mm latis subtus in nervis strigosis. Flores disci ca. 20; corollae flavae 3.5-4.3 mm longae, tubis 1.0-1.3 mm longis parce spiculiferis base pauce glanduliferis, glandulis non capitatis, faucis cylindricis 1.8-2.0 mm longis inferne dense et superne sparse spiculiferis intus sparse antrorse papillatis, lobis triangularibus ca. 0.6 mm longis et ca. 0.4 mm latis extus dense strigosis setis perruosis intus dense uniformiter breviter papillatis; filamenta glabra in partibus superioribus ca. 0.35 mm longa e thecis plerumque exserta; thecae 1.0-1.2 mm longae; appendices antherarum flavae ovatae ca. 0.4 mm longae et 0.17 mm latae base in fasciculo glanduliferae; rami stylorum breviter distincte appendiculati. Achaenia 3.0-3.3 mm longa et ca. 1.2 mm lata distincte compressa minute albo-maculata dense subsordide sericea; aristae pappi 2 ca. 3 mm longae inferne scariose alatae, squamellae pappi ca. 6 aliquantum latae 0.7-1.0 mm longae base breviter connatae distaliter valde laceratae. Grana pollinis ca. 23-25µ diam. dense hispida.

Type: NICARAGUA: Dept. Estelí: La Guava, Estelí River 22 km north of Estelí, alt. 650 m. Nov. 23-26, 1973. L.O. Williams & A. Molina R. 42374 (Holotype, US). The specimen was received as Aldama dentata var. dentata and duplicates should be sought in other herbaria under that name.

*Viguiera molinae* is in the group Blake (1918) referred to as sect. *Diplostichis* and is obviously closely related to *V. gracillima* Brandegees of Oaxaca and Chiapas. The new species has the same canescent-strigose lanceolate involucre bracts and combined strigose and scabrid upper surfaces of the leaves that occur in *V. gracillima*, and in an initial sorting was thought to be only a range extension of that species. The more robust plant with the extensive many-headed inflorescence and the narrower long-acuminate leaves was at great variance, however. Careful examination proved the species was thoroughly distinct in the rayless or nearly rayless condition of the heads. Numerous heads have been examined leaving no doubt that the heads are basically rayless. The anther collars of *V. molinae* are unusually long, also, and they extend far below the basal points of the anther thecae. Most members of the genus have anther collars scarcely longer than the bases of the thecae.

Other Central American species placed in the same section by Blake include *V. tenuis* A.Gray, *V. strigosa* Klatt and *V. sylvatica* Klatt. The first of these has involucre bracts similar to *V. molinae*, but it differs by the mostly opposite sessile leaves with non-acuminate tips, upper surfaces of the leaves with denser ascending strigose hairs and no spicules, the corolla having a very short basal tube, the corolla lobes being only as long as wide, and the lobe inner surface having much more elongate papillae. Both *V. strigosa* and *V. sylvatica* of Costa Rica differ by the glandular dots on the undersurfaces of the leaves and by the broader thicker involucre bracts without canescent-strigose pubescence. The two species have been confused in identifications and some notes suggest the two are synonyms. An isotype of *V. strigosa* and one other specimen (Standley & Valerio 44883) have been examined and prove to be notably distinct in the shorter lobes of the disk corolla that are smooth rather than papillose on the inner surface, the anthers are mostly or completely included in the mature corollas, and the anther collars are elongate, extending well below the bases of the thecae. Specimens seen of *V. sylvatica* all show very deeply cut disk corolla lobes with sparse papillae inside and long dense papillae forming a mass of hair inside the throat below the lobes, the anthers are exerted at maturity and the anther collars are short so as to scarcely extend below the bases of the thecae.

Haplocalymma microcephala (Greenm.) Blake is very closely related to the species of section Diplostichis having lanceolate canescent-strigose involucre bracts. The species has leaf pubescence precisely like that of V. gracillima and V. molinae. The only significant differences seem to be the coarsely dentate leaves and the smaller more densely clustered heads. The evenly spaced uniseriate 5 involucre bracts do not seem to warrant a generic distinction and the species should be known as V. microcephala Greenm. Contrary to Blake's characterization the pappus tends to have differentiated though short awns.

Viguiera woronowii (Blake) H. Robinson, comb. nov.

Haplocalymma woronowii Blake, Proc. Biol. Soc. Wash. 43: 163, 1930. The value of Blake's concept of Haplocalymma is essentially disproven by the nature of this second species described by him. While the species is in the general relationship, it would certainly not seem to be the closest relative of V. microcephala Greenm. The species is most distinctive in the high-conical receptacle which resembles Jaegeria. It is a similarity of some concern since the recognition of sterile rays in one species of Jaegeria, J. sterilis McVaugh. The place of V. woronowii is proven, however, by the presence of a single continuous stigmatic surface on each style branch as in all Helianthinae, there are two stigmatic lines in Jaegeria. Also, V. woronowii has a small style appendage as in typical Viguiera and the distinctly papillose appressed hairs common in Viguiera and many other Heliantheae, both characters differing from Jaegeria.

In the Flora of Panama, D'Arcy (1975) adopts a broad concept of Viguiera which includes Wedelia cordata Hook. & Arn. and which thus essentially synonymizes the genus Hymenostephium. A lectotype is also chosen by D'Arcy for the genus Gymnolomia (see below under Viguiera rudbeckioides). The broad concept was not explained by D'Arcy, but it is thoroughly justified. Blake (1918) in his monograph of Viguiera held Hymenostephium distinct for those members of the relationship having a pappus with squamellae but without differentiated awns. The distinction was very subtle since Blake retained in Viguiera species such as the S.E. U.S. endemic V. porteri (A. Gray) Blake and V. quitensis which have no pappus. The disk achenes of the latter had setae on their surfaces indicating the lack of a pappus was not the calvous form found erratically in individual specimens of pappose species throughout the

family Asteraceae. Blake provided no distinction between the two genera Viguiera and Hymenostephium in cases where calvous achenes lacking both pappus and lateral hairs occur. The latter condition is particularly common in Hymenostephium and not rare in Viguiera. There are also cases such as V. lepidostephana Cuatr. where the awns are scarcely different from the squamellae. The distinction between the genera must therefore be regarded as unworkable. There is also ample evidence that the distinction between Viguiera and Hymenostephium creates an unnatural division between closely related species.

Viguiera cordata (Hook. & Arn.) D'Arcy, distributed from Mexico to Panama, shows most of the basic features found in all species that have been placed in Hymenostephium, the cylindrical throats of the disk corollas twice or more as long as the lobes, the reddish tint of the lobes of older disk flowers, the short-triangular shape of the lobes with dense papillosity on the inner surface, the anther collars not or scarcely extending below the bases of the thecae, and the anther appendages being yellow. A few of the more restricted traits are the abruptly broadened base of the throat of the disk corollas, and a basal tube nearly 1 mm long that is essentially as scabrid as the base of the throat. There is variation in the species in the erect versus appressed pubescence used to distinguish H. guatemalense (B.L. Robins. & Greenm.) Blake, and in the shape of the paleae. Short-tipped paleae are predominant in Guatemala and long-tips are found in most Costa Rican specimens, but both types are found throughout the range of the species. The supposed difference of Hymenostephium microcephalum (Less.) Blake (including H. mexicanum Benth., the type of the genus; not V. microcephalum Greenm.), the cylindrical rather than campanulate shape of the heads, would seem mostly to distinguish immature specimens from mature material. The primary test of the species, however, seems to be the achene which has a high proportion of calvous forms and identical pappose forms throughout the range in specimens otherwise identifiable as H. cordatum, H. microcephalum and H. guatemalense. The pappose forms all show achenes with long-sericeous setosity on the sides and a distinctive stringy form of squamellae. Of all the material under the name Hymenostephium seen from Mexico and Central America, only the following seem to be distinct from Viguiera cordata.

Viguiera hintonii H. Robinson, sp. nov.

Plantae herbaceae vel suffrutescentes 1-2 m altae



laxe ramosae, ramis erectis valde patentibus. Caules tenues brunnescentes sparse minute puberuli vel glabrescentes. Folia plerumque opposita, petiolis tenuibus brevibus 3-13 mm longis sparse strigosis; laminae oblongo-lanceolatae vel anguste ovatae plerumque 3-8 cm longae et 1.2-2.7 cm latae base rotundatae margine 3-10 plerumque remote serratae apice anguste acuminatae supra et subtus sparse appresse scabrae fere ad basem trinervatae. Inflorescentiae laxe ramosae cymosae pauce capitatae, pedicellis tenuibus 1-10 mm longis sparse vel dense strigosis. Capitula 4.5-5.0 mm alta et 2.0-2.5 mm lata. Squamae involucri ca. 6 plerumque uniseriatae erectae herbaceae ovate lanceolatae 2-3 mm longae et ca. 0.9 mm latae apice acuminatae extus subglabrae vel dense strigosae. Paleae chartaceae oblongo-ovatae 3.0-3.5 mm longae et ca. 1.5 mm latae apice breviter acuminatae margine remote dentatae in costis resinosis numerosis aureo-striatae glabrae vel minute puberulae. Flores radii 5 in capitulo steriles; corollae flavae, tubis 0.3-0.5 mm longis puberulis, limbis late ellipticis 3-6 mm longis et 2.0-2.3 mm latis subtus in nervis minute strigosis. Flores disci 5-10; corollae flavae vel superne rubro-tinctae ca. 2.5 mm longae, tubis ca. 0.5 mm longis extus dense scabris, faucis ca. 1.5 mm longis base leniter demarcatis inferne scabris superne glabris, lobis triangularibus ca. 0.5 mm longis et 0.45 mm latis extus dense minute strigosis intus dense uniformiter breviter papillosis; filamenta glabra in partibus superioribus ca. 0.2 mm longa e basis thecarum non vel vix exerta; thecae ca. 1.2 mm longae; appendices antherarum flavae ovatae ca. 0.2 mm longae et 0.17 mm latae base in fasciculo glanduliferae; rami stylorum breviter distincte appendiculati. Achaenia 2.0-2.5 mm longa et ca. 0.8-1.0 mm lata distincte compressa ubique nigra et dense breviter setifera, setis erecto-patentibus; pappus nullus vel subnullus. Grana pollinis 23-25  $\mu$  diam.

Type: MEXICO: Michoacan: Steep hills about 25 km south of Arteaga, road to Playa Azul; forest of Quercus macrophylla; elev. 600-650 m. abundant, shrub 1-2 m high; flowers yellow. 27 Feb. 1965. McVaugh 22637 (Holotype, US). Paratypes: MEXICO: Guerrero: Vallecitos, Montes de Oca. Oak woods. Flower yellow. 7-17-37. Hinton et al. 10611 (US); Chilacayote 1675, Mina. Shady mixed forest. Flower yellow. 4-20-39. Hinton et al. 14182 (US).

The flowering heads of V. hintonii are the smallest of any seen in the genus and this combined with the general aspect has caused specimens to be placed under the name Hymenostephium microcephalum (Less.) Blake. The achenes are totally distinct in the short setae on

the lateral surfaces and the essential lack of pappus. Both the pappus and the long sericeous lateral setae are distinctive in V. cordata. The new species has achenes technically more like V. kingii McVaugh of Nayarit in Mexico, but the latter is a much more robust species with very elongate pedicels. One specimen of the new species (Hinton 10611) has been annotated apparently by Blake as Haplocalymma n.sp. with reference to H. woronowii. The involucrel bracts are not strictly in a single series but usually have a single extra bract as in a few other members of Viguiera sect. Diplostichis. The shape of the leaves is somewhat distinctive by being rather oblong-lanceolate with often remote teeth.

The South American species placed in Hymenostephium and the related species of Viguiera are as follows.

Viguiera anomala Blake of Colombia was not seen in this study but is supposedly distinct among those members of the group having awns by the sordid or rufous pubescence of the inflorescence and by the glabrous lateral surfaces of the achenes.

Viguiera cabreræ H. Robinson, sp. nov.

Plantae herbaceae annuae? ca. 0.5 m altae laxae ramosae. Caules tenues brunnescentes vel rubri sparse strigosi. Folia plerumque alternata basilaria opposita, petiolis tenuibus 5-17 mm longis sparse strigosis; laminae ovatae plerumque 2-6 cm longae et 1-4 cm latae base obtusae vel acutae margine utrinque ca. 6-7 serratae apice breviter acutae supra et subtus appresse strigosae fere ad basem trinervatae. Inflorescentiae laxae ramosae pauca capitatae, pedicellis tenuibus 2.0-5.5 cm longis dense strigosis. Capitula 7-9 mm alta et 5-7 mm lata. Squamae involucri 8-9 plerumque uniseriatae erectae herbaceae lineari-lanceolatae 5-6 mm longae et 1.0-1.3 mm latae apice attenuatae extus dense strigosae. Paleae chartaceae oblongae ca. 5 mm longae et 1.5 mm latae apice obtusae vel breviter acutae margine breviter dense spiculiferae extus virides vel viridivittatae inferne puberulae superne subglabrae. Flores radii 8-9 in capitulo steriles; corollae flavae, tubis ca. 1 mm longis minute sparse puberulis, limbis late ellipticis ca. 8 mm longis et 4 mm latis subtus in nervis strigosis. Flores disci ca. 15; corollae flavae ca. 4 mm longae superne et in lobis in ductis resinosis pluribus striatis, tubis 0.5-1.0 mm longis dense spiculiferis, faucis cylindricis 2.0-2.5 mm longis inferne dense et superne sparse spiculiferis intus sparse antrorse pap-

illatis, lobis triangularibus ca. 1 mm longis et 0.8 mm latis extus dense strigosis setis verrucosis intus dense uniformiter breviter papillatis; filamenta glabra in partibus superioribus ca. 0.2 mm longa e basis thecarum vix exerta; thecae ca. 1.5 mm longae; appendices antherarum flavae ovatae ca. 0.35 mm longae et ca. 0.25 mm latae non vel pauce glanduliferae; rami stylorum breviter distincte appendiculati. Achaenia ca. 3 mm longa et ca. 1.3 mm lata distincte compressa ubique nigra et dense appresse puberula; pappus nullus. Grana pollinis 23-25 $\mu$  diam.

Type: ARGENTINA: Salta: Dep. Candelaria, Rio del Potrero, en la orilla del río, alt. 1420 m. Flor amarillo. Abril 8, 1925. S. Venturi 3675 (Holotype, US). Paratypes: ARGENTINA: Salta: Dep. Capital, Cerro San Bernardo. Capitulos amarillos. 27 V 1933. A.L. Cabrera 3017 (US); Cerro San Bernardo. 31 V 1933, A.L. Cabrera 3082 (US).

The species is the southernmost of Viguiera sect. Diplostichis. The Cabrera specimens had been annotated in the U.S. National Herbarium as Hymenostephium, but they possess the combination of setiferous achenes and no pappus that Blake was inclined to retain in Viguiera. The combination of achene characters might relate the species to V. quitensis (Benth.) Blake, but the Argentinian plants are much more delicate, being perhaps annuals, and the heads are much fewer on long slender pedicels. The leaves also differ from most members of the relationship by the fewer coarser teeth on the margins and by the acute rather than acuminate tips.

Viguiera goebelii (Klatt) H. Robinson, comb. nov.

Gymnolomia goebelii Klatt in Goebel, Pflanzenbiol. Schilderung. 2: 49. 1891. No distinction is evident between this and Hymenostephium meridense Blake which was also described from the paramos near Merida in Venezuela. The species is notable for the narrowly ovate leaves with extremely dense usually appressed pubescence that nearly covers the surfaces, and by the 2-3 headed branches of the inflorescence.

Viguiera lepidostephana Cuatr. is obviously a member of the Hymenostephium-Diplostichis series in South America. The species is distinctive by the large squamose pappus segments with the awns being only slightly larger than the squamellae. The species was described from the Depart. Tumbes, Peru (Ellenberg 1423). Ferreyra 12259 represents an additional collection from the same area collected at nearly the same time.



Viguiera leptodonta Blake is among the species described having a pappus with distinct awns, but in the calvous-achened condition the species would be indistinguishable from material called Hymenostephium guatemalensis in Venezuela. The latter specimens seem best placed in the present species in view of the less expanded throats of the disk corollas which indicate they are not the same as the Central American material.

Viguiera mucronata Blake occurs in Venezuela and adjacent northern Colombia. The species has an awned pappus and is similar to the Central American V. tenuis-V. molinae-V. microcephala series discussed above having very densely strigose involucre bracts. The species is distinct among the strongly awned species of South America by the lax herbaceous habit with long pedicels and mostly alternate upper leaves.

Viguiera quitensis (Benth.) Blake is notable for the pubescent achenes with no pappus. The species has been known primarily from Ecuador. New records from Colombia (Metcalf 30029) and Venezuela (Pittier 12662; Steyermark & Dunsterville 98837) had previously been identified as Viguiera mucronata, Hymenostephium cordatum and H. guatemalense. Viguiera quitensis tends to be more robust with larger heads and longer rays than in the related species.

Viguiera rudbeckioides (HBK.) H. Robinson, comb. nov.  
Gymnolomia rudbeckioides HBK., Nov. Gen. & Sp. 4: 172, t. 574. 1818. ed folio. A specimen (Townsend A90) from Sabiango, Ecuador has been seen and seems to match all described and illustrated features of the type specimen collected in immediately adjacent Peru (Piura: Ayavaca). The species seems distinctive in the slender habit, the very short basal tube of the disk corolla, and in the long corolla lobes nearly twice as long as wide. The pappus is a fringe of minute squamellae. In selecting the species as lectotype of Gymnolomia, D'Arcy (1975) was unaware of the transfer of the species to Hymenostephium by Blake (1924, p. 630). In the same Blake paper (p. 620) the other three original species of Gymnolomia were also transferred, G. triplinervia to Aspilia triplinervia (HBK.) Blake and both G. tenella and G. hondensis HBK. to Aspilia tenella (HBK.) Blake. In view of the consistent references by Blake (1918) and D'Arcy (1975) to the Aspilia nature of Gymnolomia it would I believe require rejection of G. rudbeckioides and selection of G. tenella HBK as the lectotype of Gymnolomia.

Viguiera serrata (Rusby) H. Robinson, comb. nov.

Montanoa serrata Rusby, Desc. New Sp. S. Amer. Pl. 151. 1920. The South American material under the name Hymenostephium cordatum does not seem the same as that from Central America. The corolla is not as abruptly expanded at the base of the throat, the hairs of the achene are shorter and the pappus is different. The squamellae in V. serrata are broad with lacerations distally. The squamellae of V. cordata are divided nearly to the base into slender segments that are often partly hidden by the denser covering of setae on the sides of the achene. In addition to the type (Colombia: Magdalena: Santa Marta, H.H. Smith 516) specimens with identical form of pappus have been seen from central Colombia (Cundinamarca: Guasca, Bro. Ariste-Joseph A538) and Venezuela (Trujillo: Vicinity of Escuque, Pittier 13133). Some specimens seen with calvous achenes may also represent this species.

Viguiera viridis (Steyermark) H. Robinson, comb. nov.

Hymenostephium viride Steyermark, Fieldiana: Bot. 28 (3): 641. 1953. Syn. H. angustifolium Benth., not Viguiera angustifolia (Hook. & Arn.) Blake. The Venezuelan species is distinctive in the very short blunt involucre bracts which cover only the bases of the mature paleae. The pubescence of the leaves is very sparse compared to V. goebelii.

#### Literature Cited

- Blake, S. F. 1918. A revision of the genus Viguiera. Contr. Gray Herb. n.s. 54: 1-205.
- \_\_\_\_\_. 1924. New American Asteraceae. Contr. U.S. National Herbarium 22 (8): 587-661, i-xi, pl. 54-63.
- D'Arcy, W. G. 1975. 73. Viguiera, in Flora of Panama. Annals Missouri Bot. Gard. 62: 1156-1161.



1977  
*Aldena dentata* var. *dentata* Peddms

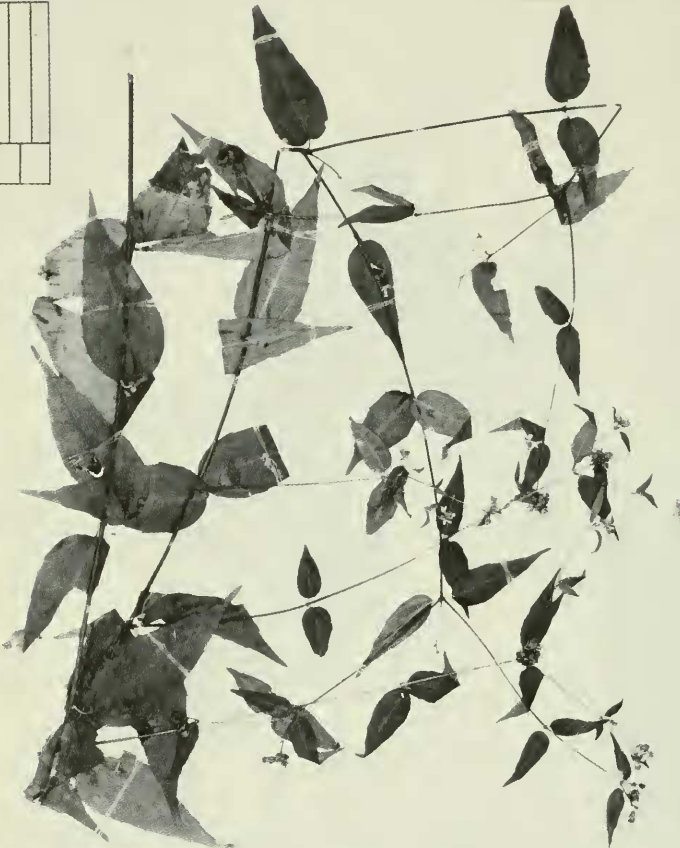
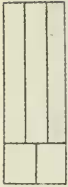
UNITED STATES

2735133

Fls. yellow, in forest along river

NATIONAL HERBARIUM

Viguiera molinae H. Robinson, Holotype, United States National Herbarium. Photo by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



PLANTS OF MICHACAN

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UNITED STATES

2704878

NATIONAL HERBARIUM

Abundant.

Shrub 1-2 m. high; flowers yellow.

... .. 22637 ... ..

Viguiera hintonii H. Robinson, Holotype, United States National Herbarium.



Viguiera hintonii, enlargement of heads.





108751

Provincia de Salta, R. A.

Sup. ...

Viguiera cabreræ H. Robinson, Holotype, United States National Herbarium.



Viguiera cabreranae, enlargement of heads.